

Estimation of quantity of materials required for steel sleepers railway track for selected stretch in Bangalore town

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Abstract : The paper concentrates on the quantity of materials required for constructing a railway track of steel sleepers for a selected stretch in Bangalore. Due to the potential of steel sleepers to offer a numerous advantages over concrete sleeper in terms of strength and durability characteristics it is feasible to provide concrete sleepers. However the initial cost of construction of steel sleepers are generally higher compared to concrete sleepers but the maintenance cost of steel sleepers prove to be cheaper compared to concrete sleepers, Because of less number of fastening systems required for steel sleepers compared to concrete sleepers therefore it's essential to build and maintain a steel sleeper for Indian railway tracks. In the project a selected stretch of a corridor of 5.6 kms was selected and railway traffic Survey was done by taking the no of railway vehicles moving in both direction per day on the existing alignment between yeshwantpur to Bangalore Junctions and from the obtained data from Railway traffic survey by applying the general Ministry of Railway formula the quantity of rails, sleepers and fasteners for the construction of new steel sleeper tracks was calculated.

IndexTerms - Steel sleepers, Loose Jaws, Keys

1. INTRODUCTION

Railways are a business and the arrangement of track and its maintenance must be fetched proficient and equivalent with the required activity undertaking if the railways are to survive and flourish. Concrete sleepers have been the regular choice for constructing branch lines, however from the past 20 years there has been a sharp decrease in the quality and accessibility of timber sleepers (Nibloe.1980). In the meantime axle loads and in a few cases yearly tonnage has consistently expanded and existing track structures are achieving their breaking points of ability to convey the heaps (Livingston et al.2001). The substitution segments particularly sleepers must be equipped for supporting future activity necessities and give adequate flexibility to suit the overhauling of other track segments, Especially rails, all at a productive cost.

The dynamic effect of running trains causes overwhelming wear and tear of the track. It winds up plainly important to restore or recharge the track occasionally to guarantee that it keeps on being protected and effective(Nibloe.1980). Overwhelming track reestablishments are completed on Indian Railways consistently to keep the track safe and in a decent running condition and also to cut down the cost of support however much as could reasonably be expected. The cost of track reestablishments did on Indian Railways keeps running into a few thousand million. About 2000 to 3000 km of track renewal is done annually. As track renewals are costly proposals, they are formulated after a lot of deliberation and are well scrutinized at various administrative levels before they are finalized and included in the annual works programme. For the most part, there is overwhelming and overabundance of track reestablishment take a shot at record of the deficiency of perpetual way material and the absence of satisfactory assets for track restoration programs (Mittal. 2017). Holding the administration of averaged tracks not just prompts an expanded cost of upkeep yet additionally influences the security and smoothness of the development of activity. Due to delays in track recharges, episodes of rail cracks have been dynamically expanding. Long extends of track have additionally been set under speed confinements inferable from this excess in track restorations. The Indian Railways has attempted a gigantic program of track recovery, and according to the present arrangement, the overabundance in track recharging will be totally cleared in couple of years.

2. METHODOLOGY

2.1 Project Alignment

To design the rehabilitation work a stretch of 5.6 Km were taken from two stations respectively that is from Bangalore central railway station to yeshwantpur railway station. Both the stations were classified and used for domestic purposes which mainly concentrate on passengers and goods transfer points of view of a country.

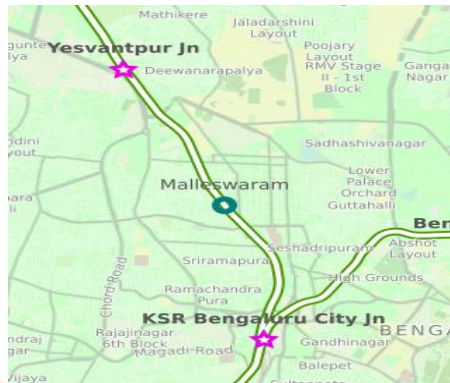


FIGURE 1. RAILWAY ALIGNMENT VIEW FROM BANGALORE SC TO YESHWANTPUR.

COURTESY : (FROM THE WEBSITE OF INDIAN RAILWAY MAPS)

2.2 RAILWAY TRAFFIC DATA SURVEY

AS PER THE SURVEY THE TOTAL NO OF RAILWAY LOCOMOTIVES OF GOODS AND PASSENGER TRAIN WHICH TRAVEL BETWEEN THESE TWO STATIONS WERE TAKEN DURING A DAY AND THROUGHOUT THE WEEK.

TABLE 1: RAILWAY TRAFFIC DATA SURVEY

CLASS OF TRAIN/ LOCOMOTIVES	NO OF TRAIN TRAVEL PER DAY
MAIL/EXPRESS TRAINS (SEMI SPEED TRAINS)	15
PASSENGER TRAINS (SLOWER SPEED TRAINS)	11
SUPER FAST TRAINS (HIGHER SPEED TRAINS)	02
GOODS TRAIN (SLOWER JOURNEY SPEED TRAINS)	08
DEMO TRAINS (SLOWER SPEED TRAINS)	01

3. ESTIMATION OF QUANTITY OF MATERAILS

3.1 General Specifications of Steel Railway Track

Around 27% of the track on Indian Railways is laid on steel sleepers. The expanding deficiency of timber in the nation and other temperate variables are essentially in charge of the utilization of steel sleepers in India

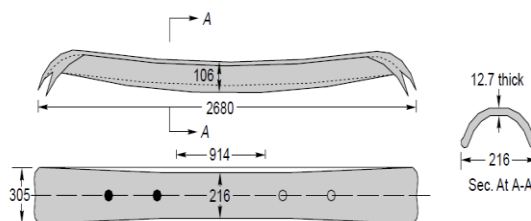


Figure 2. General Cross section of Steel Sleeper in mm.

Courtesy: From the Code book of Ministry of Railways (4 th Ed.), Pg No: 71.

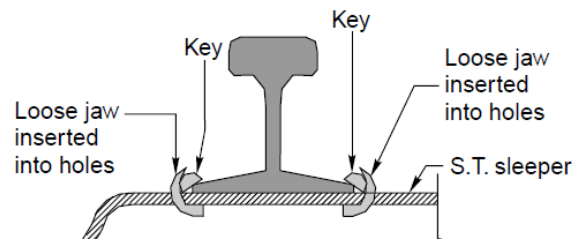


FIGURE 3: GENERAL CROSS SECTION OF STEEL SLEEPER RAILWAY TRACK.

COURTESY: FROM THE CODE BOOK OF MINISTRY OF RAILWAYS (4 TH ED.), PG No: 72.

3.2 Calculation of Quantity of Rails

Length of the Stretch=5.6 kms= 5600 mts.

Standard Length of Rail= 13 mts.

Number of rails = $(5600/13)*2 = 862$ Nos.

3.3 Calculation of Quantity of Sleepers

Number of Sleepers= $(13+7)*(862/2)=8620$ Nos.

3.4 Calculation of Quantity of Fish plates

Each joint Require four no of Fish plates

Number of Fish plates = $4* \text{No of Rails}$

= $4*862$

=3448 Nos.

3.5 Calculation of Quantity of Fish bolts

Each joint requires two fish plates:

Number of fish bolts = $2 \times \text{number of rails per km}$

= 2×862

= 1724 Nos

3.6 Calculation of Quantity of Keys and Loose Jaws

3.6.1 Keys

Four keys are required per sleeper: Number of keys = $4 \times 8620 = 34480$ Nos.

3.6.2 Loose jaws

Four loose jaws are required per sleeper:

Number of loose jaws = $8620 \times 4 = 34480$ Nos.

4. CONCLUSIONS

The ability of steel sleepers to extend the lives of existing track components and generally stabilise, tie and strengthen existing tracks to carry bigger and heavier trains with reducing maintenance resources has enabled railways to achieve substantial cost savings. For these railways, steel sleepers have indeed provided a cost efficient track.

The total Number of quantities required for laying of a steel sleepers of railway track for 5.6 kms stretch.

TABLE 2: CALCULATED QUANTITY OF MATERIALS FOR 5.6 KMS RAILWAY TRACK

Material	Quantity in Numbers
Rails	862
Sleepers	8620
Fish plates	3448
Fish bolts	1724
Loose Jaws	34480
Keys	34480

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